

quakes which he has tabulated, and the work before us deals with the records of 171,434 distinct shocks. The labour involved in this compilation would have formed no light task for any man, and when we remember that, besides being a specialist in seismological statistics, the author is an officer on the active list of the French Army, the result seems almost miraculous.

In summing up the results of all this compilation the author holds that he has conclusively established the independence of earthquakes and volcanoes, and the greater prevalence of the former along those tracts where the surface relief shows the steepest and longest gradients. Both these conclusions had been reached by Prof. Milne while working in Japan, and the second of them is only an empirical, and not invariable, way of expressing the general principle that earthquakes are most abundant where the crust-movements have been greatest and most recent, while they become rarer as these movements are older and have more or less completely died out; but we must remark that earthquakes seem to be more particularly associated with the changes resulting from, or accompanied by, compression, for the dropped valleys of the Jordan, the Red Sea, and of Central Africa are not specially affected by earthquakes.

Comte de Montessus attempts to carry his conclusions still further, and finds that earthquakes are almost confined to certain bands which correspond with the secondary geosynclinals of Haug, and are said to lie along two great circles, making an angle of  $67^{\circ}$  with each other. We have had the curiosity to plot these bands, as shown on the map accompanying the book, upon a globe, and have failed to find any correspondence between them and the great circles as defined, or, indeed, with any other great circles; approximately, they seem to form a network of arcs of great circles, joining up in groups of three and four, an interpretation which is more probable than the other, though the departures in detail render the correctness of either view doubtful. However this may be, the fact remains that nine-tenths of the shocks recorded have originated in regions which cannot cover more than one or two per cent. of the globe and are almost all distributed along certain lines, of which the most important are the great girdle of the Pacific, the line which runs up from the Sunda Islands, through Arracan, the Himalayas, Caucasus, and Alps to the western Mediterranean, and another which runs up from the Caucasus through the mountains of Central Asia to Lake Baikal, possibly continuing to somewhere in the neighbourhood of the Bering Straits.

Though, in the main, the distribution of the more violently shaken regions shows no change from that drawn by Mallet in 1858, there is a radical difference in the character of the two maps. In Mallet's the frequency of earthquakes was indicated by the depth of tint, and the dark patches shaded off gradually into the white; de Montessus, believing that it is a mistake to treat an essentially discontinuous phenomenon as a continuous one, has made the limited areas, where destructive earthquakes are known to

originate, black, and left the rest of the map blank. This abrupt boundary between the regions classed as seismic and the much more extensive ones classed as peneseismic or aseismic, is held to be a better representation of what is actually the case than any gradual shading of the one into the other. The difference between the two maps is, in fact, one of principle; Mallet's was meant to indicate the frequency with which earthquakes were felt, that of de Montessus the frequency with which they originate. Each of these facts is interesting in itself, but their delineation must necessarily differ, apart from any question of increasing perfection of the data.

We have indicated some of the conclusions drawn in this book, which do not seem to be so fully established as its author suggests, but this must not be taken in derogation of the value of his work in statistical seismology. We welcome this summary of his researches, and regret that he should have followed the custom, so common in France, of omitting a subject index.

#### OUR BOOK SHELF.

*Notes on Shipbuilding and Nautical Terms of Old in the North.* By E. Magnusson. Pp. 62. (London: A. Moring, Limited, 1906.) Price 1s. net.

This small volume reproduces a paper read before the Viking Club Society, and its appearance will be welcomed by all who are interested in the history and development of shipbuilding. Although it deals chiefly with Scandinavian records and discoveries, it contains an excellent summary of Greek and Latin references to ancient ships, and does not leave unnoticed much older Egyptian types. In short it is a scholarly performance, and the writer has a full appreciation of technical developments which have accompanied progress in shipbuilding. Wide reading and research must have been undertaken to provide the materials; they have been dealt with in a terse but clear style, and the result is of permanent value as a book of reference and a bibliography of the subject. An excellent glossarial index is appended. The only regret one feels is that there are no illustrations. The rock-carvings of ancient ships found in Egypt, Sweden, and Norway are described and compared; but simple illustrations would have emphasised the deductions made by the author. Again, the details of methods of construction which Mr. Magnusson gives are readily understood by experts in shipbuilding, but would be grasped by general readers also if diagrams of a simple nature had been given. The ancient ships found in Scandinavia and preserved in museums might also have been pictured with great advantage. Of course size and cost would be increased if this were done, but that action is well worth the consideration of both author and publisher, as the permanent value of the book would be greatly increased thereby, and its place in the libraries of all interested in shipbuilding would be assured.

A book so condensed in form and substance must be read to be understood. Mr. Magnusson does not claim originality in discovery or treatment. He starts with the log and raft of the stone age, passes to the canoe hollowed from a single log by the use of fire and flint implements; traces the development of the coracle and other hide-covered vessels, with internal framework; shows how these "skins" were replaced by wood planks, first fastened by thongs or withes,

and later on by iron nails; and so he arrives at methods of building which persisted, with trifling variations, until wood gave place to iron in the last century. As regards propulsion a similar advance is traced from the single oar, to the rowing boat, and the galley with its banks of oars, coming at last to the use of masts and sails, as navigation took a wider and over-sea range. The special provisions made in vessels used for purposes of war are described, including that most ancient method of attack—the ram-bow. Altogether the book is an excellent piece of work.

W. H. W.

*A First German Course for Science Students.* By Prof. H. G. Fiedler and F. E. Sandbach. Pp. x+99. (London: A. Moring, Ltd., 1906.) Price 2s. 6d. net.

It is essential that students who intend to devote serious attention to science should be able to read scientific works in French and German, and, if possible, also in Italian. By the use of the present book a working knowledge of the German language can be obtained through lessons based upon work in elementary physics and chemistry. The book consists of a series of reading lessons describing simple experiments and principles such as are included in the rudimentary courses of schools. The words and phrases used in the various reading-passages are graded in such a way that the principal rules and grammatical forms are illustrated by the text. A short outline of grammar essential for the purpose in view follows the series of lessons, and there is a full vocabulary.

The book is printed in English characters, but the text and illustrations have a decidedly German appearance, as is appropriate in this case. Though the course covered by the lessons is similar in substance to that taken as introductory science in many schools, no doubt most teachers will prefer to follow English text-books for the actual work of the class-room and laboratory, and to use this book as an auxiliary aid or an incentive to the study of German. For pupils who are familiar with the experiments described, the book will be found very useful, and it will make them acquainted with the German equivalent of many technical terms not to be found in the ordinary reading books of the language. As an attempt to coordinate the teaching of modern languages and science, it will no doubt be appreciated, and for the finer feeling of literature pupils may still read extracts from the works of standard authors.

*Personal Hygiene Designed for Undergraduates.* By Dr. A. A. Woodhall. Pp. vii+221. (London: Chapman and Hall, Ltd., 1906; New York: John Wiley and Sons.) Price 4s. 6d. net.

PERSONAL hygiene is an important branch of hygiene which does not receive its full measure of treatment in any text-book, but this small work does not pretend to offer to its readers more than a clear and elementary statement upon the hygienic needs of the body. It is intended for undergraduate students, and it consists of the substance of lectures upon personal hygiene delivered by the author during the past few years. Exercise, food, clothing, habits, and similar matters of daily individual concern, are here dealt with in language as free from technical terms as possible. We are told in the preface that the constant aim of the writer has been to present actual conditions in the simplest language, and it must be said that he has achieved this object. We may add that the work is free from "Americanisms"—either of wording or spelling.

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Only such elementary facts of anatomy and physiology as are necessary to the reasonable understanding of the subject are introduced, and some hints as to "first aid" are here and there given in the text, but this subject is otherwise omitted.

The chapters on alcohol, tobacco, and exercise are particularly good. They are discussed in tolerant language and with much sound common-sense. After reading the following opinion (p. 157) the reader will think twice before he refuses an offer of confectionery. "Where the taste has not been vitiated, in a degree by tobacco but chiefly by alcohol, sugar is as acceptable to the normal civilised man as it is to savages, and his disposition toward candy is no bad test of his drinking habits."

The following criticism of our **national** game of cricket will scarcely meet with approval in this country:—"Cricket, an exotic that has never taken wide root on our soil, lacks many of the qualities of a good game, chiefly because of the long waits before going to the bat and the limited number actively engaged." But though the author does not write in his usually well-informed manner upon this particular item, the following statement (p. 88) will serve to acquit him of the charge of bias towards *every thing American*:—"The misnamed nasal twang with which some Americans are justly charged is due partly to chronic catarrh, blocking the nasal passages, and partly to that curious and unconscious imitation by which in youth we acquire the tone most commonly heard. Unfortunately, as a people all our voices are too sharp and rasping. . . . We are so accustomed to strident voices that we fail to recognise their inherent infirmity."

*Life and Matter. A Criticism of Prof. Haeckel's "Riddle of the Universe."* By Sir Oliver Lodge. Pp. ix+200. (London: Williams and Norgate, 1905.) Price 2s. 6d. net.

It is difficult to pardon Prof. Haeckel for his dogmatism and his over-statements, and no less for his having furnished the peg on which have been hung many dull books and reviews. Forgiveness becomes easier when his work evokes a first-rate criticism like that in the volume before us. Sir Oliver Lodge contests chiefly (a) the right by which the name of Monism is arrogated to the Haeckelian philosophy; (b) Haeckel's statement of the "Law of Substance," the true account of which, according to the critic, is that "anything which actually exists must be in some way or other perpetual"; (c) Haeckel's account of the development of life, and particularly the theory which endows the atoms of matter with life, will, and consciousness.

The later chapters of the book state with great clearness Sir Oliver Lodge's own constructive views. He regards it as possible that life is a basal form of existence, as fundamental an entity as matter and energy. "It can neither generate nor directly exert force, yet it can cause matter to exert force on matter, and so can exercise guidance and control." His view occupies a middle position between the so-called monistic one and that, for example, of Prof. James Ward, who argues that the laws of physics are only approximate and untrustworthy.

The author, who understands well that effective illustration is half the difficulty, and that the "analogy of experience" is one of the soundest of philosophic principles, develops a fascinating comparison between life and magnetism. If we understand his views aright they imply that possibly mind can exist apart from terrestrial brains, and life apart from living creatures or plants as we know them—that is, that the phenomena of life and consciousness